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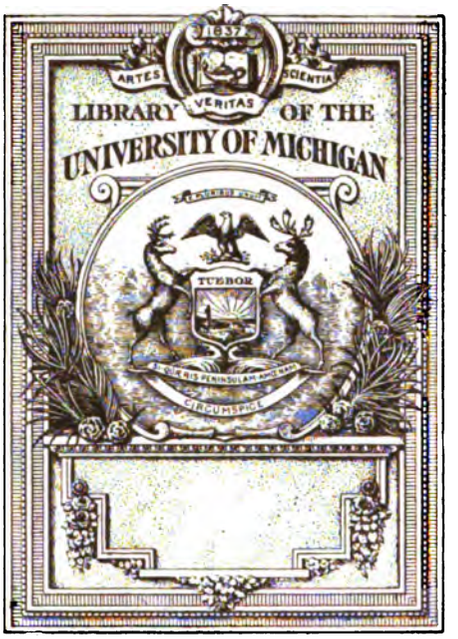
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U.S BUREAU OF THE CENSUS
SAM. L. ROGERS, DIRECTOR

CENSUS OF MANUFACTURES
1914

ELECTRICAL MACHINERY APPARATUS, AND SUPPLIES

Prepared under the supervision of W. M. STEUART, Chief Statistician for Manufactures

CONTENTS

	Page
Explanation of terms	2
Summary and analysis	3
Scope of the industry	3
Comparison with earlier censuses	3
Summary, by states	3
Persons engaged in the industry	3
Wage earners employed, by months	6
Prevailing hours of labor	6
Character of ownership	7
Size of establishments	8
Expenses	9
Engines and power	10
Fuel consumed	10
Special statistics relating to products	10
Dynamos	11
Transformers	12
Switchboards	12
Motors	12
Special statistics relating to products—Continued.	
Batteries	13
Carbons	13
Arc lamps and searchlights	13
Incandescent lamps	13
Fixtures and fittings	14
Telegraph apparatus	14
Telephone apparatus	14
Insulated wire and cables	15
Electric heating	15
Electric measuring instruments	15
Miscellaneous electrical apparatus	16
Detail state tables:	
Table 31.—Electrical machinery, apparatus, and supplies—Comparative summary for 1914, 1909, and 1904	17
Table 32.—Electrical machinery, apparatus, and supplies—Detail statement, by states: 1914	18

WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

EXPLANATION OF TERMS.

Scope of census.—Census statistics of manufactures are compiled primarily for the purpose of showing the absolute and relative magnitude of the different branches of industry covered and their growth or decline. Incidentally, the effort is made to present data throwing light upon character of ownership, size of establishments, and similar subjects. When use is made of the statistics for these purposes it is imperative that due attention should be given to their limitations, particularly in connection with any attempt to derive from them figures purporting to show average wages, cost of production, or profits.

The census did not cover establishments which were idle during the entire year or whose products were valued at less than $500, or the manufacturing done in educational, eleemosynary, and penal institutions.

Period covered.—The returns relate to the calendar year 1914, or the business year which corresponded most nearly to that calendar year, and cover a year's operations, except for establishments which began or discontinued business during the year.

The establishment.—As a rule, the term "establishment" represents a single plant or factory, but in some cases it represents two or more plants which were operated under a common ownership or for which one set of books of account was kept. If, however, the plants constituting an establishment as thus defined were not all located within the same city or state, separate reports were secured in order that the figures for each plant might be included in the statistics for the city or state in which it was located.

Influence of increased prices.—In comparing figures for cost of materials, value of products, and value added by manufacture in 1914 and 1909 with the corresponding figures for earlier censuses, account should be taken of the general increase in the prices of commodities during recent years. To the extent to which this factor has been influential the figures fail to afford an exact measure of the increase in the volume of business.

Persons engaged in the industry.—The following general classes of persons engaged in the industry distinguished: (1) Proprietors and firm members, (2) salaried officers of corporations, (3) superintendents and managers, (4) clerks (including other subordinate salaried employees), and (5) wage earners. In the reports for the censuses of 1904 and 1899 these five classes were shown according to the three main groups: (1) Proprietors and firm members, (2) salaried officials, clerks, etc., and (3) wage earners. In comparative tables covering the census of 1904 it is of course necessary to group the figures according to the classification that was employed at the earlier censuses.

The number of persons engaged in the industry, distributed by sex, and, in the case of wage earners, also by age (whether under 16 or 16 and over), was reported for a single representative day. The 15th of December was selected as representing for most establishments normal conditions of employment, but where this date was not a representative day an earlier date was chosen.

In the case of employees other than wage earners the number thus reported for the representative date has been treated as equivalent to the average for the year, since the number of employees of this class does not ordinarily vary much from month to month. In the case of wage earners the average has been obtained in the manner explained in the next paragraph.

In addition to the more detailed report by sex and age of the number of wage earners on the representative date, a report was obtained of the number employed on the 15th of each month, without distinction of sex or age. From these figures the average number of wage earners for the year has been calculated by dividing the sum of the numbers reported for the several months by 12. The average thus obtained approximates the number of wage earners that would be required to perform the work done if all were constantly employed during the entire year. Accordingly, the importance of the industry as an employer of labor is believed to be more accurately measured by this average than by the number employed at any one time or on a given day.

In order to determine as nearly as possible the sex and age distribution of the average number of wage earners for the industry as a whole, the per cent distribution by sex and age of the wage earners reported for December 15, or the nearest representative day, has been calculated from the actual number reported for that date, the percentages thus obtained have been applied to the average number of wage earners for the year in the industry to determine the average number of men, women, and children employed.

Salaries and wages.—Under these heads are given the total payments during the year for salaries and wages, respectively. The Census Bureau has not undertaken to calculate the average annual earnings of either salaried employees or wage earners. Such averages would possess little real value, because they would be based on the earnings of employees of both sexes, of all ages, and of widely varying degrees of skill. Furthermore, so far as wage earners are concerned, it would be impossible to calculate accurately even so simple an average as this, since the number of wage earners fluctuates from month to month. The Census Bureau's figures for wage earners, as already explained, are averages based on the number employed on the 15th of each month and represent the approximate number who would be required to perform the work if all were continuously employed during the year, whereas the actual number to whom the total wages were paid would be larger.

Prevailing hours of labor.—No attempt was made to ascertain the number of wage earners working a given number of hours per week. The inquiry called merely for the prevailing practice followed in each establishment. Occasional variations in hours in an establishment from one part of the year to another were disregarded, and no attention was paid to the fact that a limited number of wage earners might have hours differing from those of the majority. All the wage earners of each establishment are therefore counted in the class within which the establishment itself falls. In most establishments, however, all or practically all the wage earners work the same number of hours, so that the figures give a substantially correct representation of the hours of labor.

Capital.—The instructions on the schedule for securing data relating to capital were as follows:

> The answer should show the total amount of capital, both owned and borrowed, on the last day of the business year reported. All the items of fixed and live capital may be taken at the amounts carried on the books. If land or buildings are rented that fact should be stated and no value given. If a part of the land or buildings is owned, the remainder being rented, that fact should be so stated and only the value of the owned property given. Do not include securities and loans representing investments in other enterprises.

These instructions were identical with those employed at the census of 1909. The data compiled in respect to capital, however, at both censuses, as well as at all preceding censuses of manufactures, have been so defective as to be of little value except as indicating very general conditions. In fact, it has been repeatedly recommended by the census authorities that this inquiry be omitted from the schedule. While there are some establishments whose accounting systems are such that an accurate return for capital could be made, this is not true of the great majority, and the figures therefore do not show the actual amount of capital invested.

Materials.—The statistics as to cost of materials relate to the materials used during the year, which may be more or less than the materials purchased during the year. The term "materials" covers fuel, rent of power and heat, mill supplies, and containers, as well as materials which form a constituent part of the product.

Rent and taxes.—The taxes include internal revenue, corporation income tax, and state, county, and local taxes. In some instances the amount of the corporation tax for 1914 had not been ascertained when the report was prepared and the amount paid for 1913 was given.

Value of products.—The amounts given under this heading represent the selling value or price at the factory of all products manufactured during the year, which may differ from the value of the products sold.

Value added by manufacture.—The value of products is not a satisfactory measure of either the absolute or the relative importance of a given industry, because only a part of this value is actually created by the manufacturing processes carried on in the industry itself. Another part, and often by far the larger one, represents the value of the materials used. For many purposes, therefore, the best measure of the importance of an industry is the value created by the manufacturing operations carried on within the industry. This value is calculated by deducting the cost of the materials used from the value of the products. The figure thus obtained is termed in the census reports "value added by manufacture."

Cost of manufacture and profits.—The census data do not show the entire cost of manufacture, and consequently can not be used for the calculation of profits. No account has been taken of interest or depreciation, rent of offices and buildings other than factory or works, insurance, ordinary repairs, advertising, and other sundry expenses.

Primary horsepower.—This item represents the total primary power generated by the manufacturing establishments plus the amount of power, principally electric, rented from other concerns. It does not cover the power of electric motors taking their current from dynamos driven by primary power machines operated by the same establishment, because the inclusion of such power would obviously result in duplication. The figures for primary horsepower represent the rated capacity of the engines, motors, etc., and not the amount of power in actual daily use, since in most cases an engine or motor is not required to deliver continuously its full rated horsepower.

Fuel.—Statistics of the quantity of fuel used are shown only for anthracite and bituminous coal, coke, oil, and gas. They relate to the quantity used during the year, which may be more or less than the quantity purchased. As only the principal varieties of fuel are shown, no comparison can be made with the total cost of all fuel.

ELECTRICAL MACHINERY, APPARATUS, AND SUPPLIES.

By ESTELLE E. DEISHER.

SUMMARY AND ANALYSIS.

Scope of the industry.—This report covers the manufacture of machinery, apparatus, and supplies for use in the generation, transmission, or utilization of electric energy. In addition to dynamos, transformers, switchboards, motors, and batteries, for its generation, regulation, application, and storage, the general utilization of electric energy for supplying power, transportation, light, heat, intelligence, etc., involves the use of a vast variety of electrical manufactures, such as insulated wire and cables, starting and controlling apparatus, electric measuring instruments, telephone and telegraph apparatus, incandescent and arc lamps, electric heating and cooking apparatus, flatirons, therapeutic apparatus, circuit fittings, and other supplies. The report takes no cognizance of the manufacture of poles, glass and porcelain ware for electrical purposes, the drawing of copper wire, nor the production of electrochemical and electrometallurgical products. Statistics of electric lighting fixtures made in establishments engaged primarily in their manufacture are not included in this report, but are shown separately in the general report on manufactures.

Comparison with earlier censuses.—Table 1 summarizes the statistics of establishments engaged in the manufacture of electrical machinery, apparatus, and supplies for each census from 1879 to 1914, and gives percentages of increase.

Table 1

	NUMBER OR AMOUNT.						PER CENT OF INCREASE.[1]				
	1914	1909	1904	1899	1889	1879	1909–1914	1904–1909	1899–1904	1889–1899	1879–1889
Number of establishments	1,030	1,009	784	581	189	76	2.1	28.7	34.9	207.4	148.7
Persons engaged	144,712	105,600	71,485	(2)	(2)	(2)	37.0	47.7	.....	.....	.....
Proprietors and firm members	368	439	400	(2)	(2)	(2)	−16.2	9.8	.....	.....	.....
Salaried employees	26,266	17,905	10,619	5,067	(2)	(2)	46.7	68.6	109.6	.....	.....
Wage earners (average number)	118,078	87,256	60,466	42,013	8,802	1,271	35.3	44.3	43.9	377.3	.....
Primary horsepower	227,731	158,768	105,376	43,674	7,494	(2)	43.4	50.7	141.3	.....	.....
Capital	$355,724,756	$267,844,432	$174,066,026	$83,659,924	$18,997,337	$1,509,758	32.8	53.9	108.1	340.4	1,158.3
Salaries and wages	109,097,610	69,574,540	42,932,406	25,210,917	5,366,188	683,164	56.8	62.1	70.3	369.8	685.5
Salaries	35,291,281	20,193,395	11,090,895	4,631,723	(2)	(2)	74.8	82.1	139.5	.....	.....
Wages	73,806,329	49,381,145	31,841,511	20,579,194	(2)	(2)	49.5	55.1	54.7	.....	.....
Paid for contract work	290,889	368,049	266,410	(2)	(2)	(2)	−21.0	38.2	.....	.....	.....
Rent and taxes (including internal revenue)	3,286,870	1,962,722	[3] 1,334,837	(2)	(2)	(2)	67.4	47.0	.....	.....	.....
Cost of materials	154,728,076	108,566,404	66,836,926	49,458,272	8,819,498	1,116,470	42.5	62.4	35.1	460.8	689.9
Value of products [4]	335,170,194	221,308,563	140,809,369	92,434,435	19,114,714	2,655,036	51.4	57.2	52.3	383.6	619.9
Value added by manufacture	180,442,118	112,742,159	73,972,443	42,976,163	10,295,216	1,538,566	60.0	52.4	72.1	317.4	569.1

[1] A minus sign (−) denotes decrease. [2] Figures not available. [3] Exclusive of internal revenue.
[4] Not including the value of electrical machinery, apparatus, and supplies made in establishments primarily engaged in other industries, to the value of $24,261,961 for 1914; $18,728,916, for 1909; $18,742,033, for 1904; and $13,397,430, for 1899.

Electrical apparatus first appeared among the classified industries at the census of 1850, when 2 establishments, engaged primarily in the manufacture of electro-magnetic instruments, were reported with products valued at $5,100. At the census of 1860 there were 4 establishments with products valued at $59,000, but at the census of 1870, which covered the year 1869, the industry was not separately reported. At the census of 1879 there were 76 establishments reported as engaged in the manufacture of electrical apparatus and supplies, including telegraph and telephone apparatus. These establishments gave employment to 1,271 wage earners, and their products were valued at $2,655,036. The industry increased rapidly during the 35 years covered by Table 1.

The decrease in proprietors and firm members for 1914 as compared with 1909 is in keeping with the tendency to incorporate the business of firms and individuals, more particularly the former, the proprietors and firm members becoming officers and managers of incorporated companies. Contract work is a relatively small item and may show considerable increase or decrease at different censuses, depending upon the methods followed during the respective years.

Although in most items the per cent of increase for 1909–1914 is less than that for 1904–1909, on account of the larger base on which the former is computed, the actual gains for 1914 as compared with 1909 for every item, except number of establishments, proprietors and firm members, capital, and contract work, exceed the gains for any prior five-year period.

Summary, by states.—Table 2 summarizes the more important statistics of the industry, by states, the states being arranged according to the value of products reported for 1914. Kentucky, South Carolina, Washington, and Tennessee, for which data can not be shown separately without disclosing the operations of individual establishments, ranked sixteenth, nineteenth, twenty-first, and twenty-second, respectively, in value of products.

Table 2

STATE.	Number of establishments.	ELECTRICAL MACHINERY, APPARATUS, AND SUPPLIES: 1914. Wage earners. Average number.	Per cent distribution.	Rank. 1914	Rank. 1909	Value of products. Amount.	Per cent distribution.	Rank. 1914	Rank. 1909	Value added by manufacture. Amount.	Per cent distribution.	Rank. 1914	Rank. 1909	PER CENT OF INCREASE.[1] Wage earners (average number). 1909–1914	1904–1909	1899–1904	Value of products. 1909–1914	1904–1909	1899–1904	Value added by manufacture. 1909–1914	1904–1909	1899–1904
United States	1,030	118,078	100.0	....	....	$335,170,194	100.0	....	....	$180,442,118	100.0	....	....	35.3	44.3	43.9	51.4	57.2	52.3	60.0	52.4	72.1
New York	215	23,738	20.1	1	1	73,944,708	22.0	1	1	35,919,949	19.9	1	1	25.1	16.4	57.2	50.0	39.4	55.8	64.7	24.6	72.3
Illinois	142	16,453	13.9	3	5	45,667,456	13.6	2	5	26,288,292	14.6	3	5	71.0	57.2	1.4	70.2	60.6	37.2	99.2	45.8	20.8
Pennsylvania	105	14,966	12.6	4	4	44,395,789	13.2	3	2	27,155,769	15.1	2	2	34.8	17.2	20.3	41.6	19.4	37.4	52.4	19.6	92.4
Massachusetts	91	17,126	14.5	2	2	43,869,294	13.1	4	4	26,172,387	14.5	4	3	18.0	64.9	69.1	55.9	77.2	51.4	69.9	80.0	68.3
New Jersey	76	14,405	12.2	5	3	40,740,810	12.2	5	3	20,191,534	11.2	5	4	29.8	77.1	60.1	43.6	105.5	83.2	44.8	101.1	73.5
Ohio	119	12,695	10.8	6	6	36,120,978	10.8	6	6	18,638,730	10.3	6	6	57.3	57.9	35.5	92.4	70.4	69.4	61.4	82.8	99.6
Connecticut	43	5,059	4.3	7	7	14,330,156	4.3	7	7	6,894,026	3.8	7	7	44.3	105.3	77.6	45.9	98.9	55.9	49.4	111.0	83.1
Indiana	41	4,075	3.4	8	8	8,879,178	2.6	8	8	4,948,531	2.7	8	8	32.6	117.0	60.7	15.0	170.1	80.1	23.0	124.9	123.2
Missouri	19	2,560	2.2	9	12	6,643,210	2.0	9	11	4,227,457	2.3	9	10	141.5	33.3	49.2	104.4	86.7	91.1	97.0	89.2	104.1
Rhode Island	13	1,581	1.3	11	9	5,466,065	1.6	10	9	1,674,995	0.9	12	11	−1.2	13.6	63.1	−14.7	17.9	6.3	−7.7	28.0	45.0
Wisconsin	29	2,115	1.8	10	10	5,396,802	1.6	11	10	3,333,082	1.9	10	9	50.1	17.0	128.5	40.7	20.1	245.7	39.7	9.7	284.8
Michigan	35	1,144	1.0	12	11	3,415,500	1.0	12	12	1,675,952	0.9	11	12	−6.1	130.2	187.5	46.8	231.5	60.3	29.2	217.9	59.4
California	29	780	0.7	13	13	2,861,653	0.9	13	13	1,301,395	0.7	13	13	79.3	7.9	69.3	77.4	60.7	80.6	90.0	20.2	189.3
Minnesota	17	236	0.2	14	15	748,948	0.2	14	15	401,107	0.2	14	15	26.2	10.0	.....	42.4	24.1	86.1	31.0	29.1	128.6
West Virginia	4	162	0.1	16	18	566,368	0.2	15	16	382,806	0.2	15	16	18.2	.....	.....	42.2	.....	.....	45.8	.....	.....
New Hampshire	6	228	0.2	15	14	351,877	0.1	17	17	186,869	0.1	17	17	18.1	.....	.....	−9.3	158.7	−17.6	19.7	.....	.....
Iowa	5	94	0.1	19	23	234,760	0.1	18	19	147,545	0.1	18	19	.....	.....	.....	17.5	.....	.....	18.4	.....	.....
North Carolina	4	78	0.1	22	20	177,075	0.1	20	22	70,799	(2)	24	25	−35.0	.....	.....	18.0	.....	.....	.....	.....	.....
Colorado	8	79	0.1	21	....	138,451	(2)	23	....	85,240	0.1	20	....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maryland	6	66	(2)	24	19	121,084	(2)	24	23	81,343	(2)	23	22	−45.5	−24.8	3.9	−17.7	−34.7	−15.7	.....	−39.5	−14.8
All other States	23	509	0.4	....	....	1,098,082	0.3	....	....	664,810	0.4	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Percentages are based on figures in Table 31; a minus sign (−) denotes decrease. Percentages are omitted where base is less than 100 for wage earners or less than $100,000 for value of products or value added by manufacture, or when comparable figures can not be given.
[2] Less than one-tenth of 1 per cent.

Although establishments engaged in the manufacture of one or more of the various classes of products embraced in this industry were reported from 33 states and the District of Columbia in 1914, the industry was largely centralized, as in 1909, in the 6 states of New York, Illinois, Pennsylvania, Massachusetts, New Jersey, and Ohio. These states reported 84.1 per cent of the total average number of wage earners, 85 per cent of the total value of products, and 85.5 per cent of the total value added by manufacture. There were, however, some changes in the relative rank of these states as measured by the value of products in 1914 as compared with 1909. Pennsylvania ranked second in 1909, but third in 1914. Illinois advanced from fifth to second place. New Jersey ranked third in 1909 but fifth in 1914, and Massachusetts was fourth at both censuses.

New York was the leading state in the industry, ranking first at the censuses of 1914, 1909, and 1904. During 1914 the state produced electrical machinery, apparatus, and supplies to the value of nearly $74,000,000, or more than one-fifth of the total for the United States. The number of wage earners employed in the state increased 25.1 per cent during the census period ending with 1914, while the value of products increased 50 per cent and the value added by manufacture 64.7 per cent.

Illinois showed the most conspicuous gains among the six leading states. The average number of wage earners increased by 6,842, or 71 per cent, and the value added by manufacture, $13,090,000, or 99.2 per cent. Although Pennsylvania showed substantial increases in the three items, the state merely held its rank in value added by manufacture, which increased $9,340,000, or 52.4 per cent, and in average number of wage earners which increased 3,841, or 34.8 per cent, while in value of products, which increased $13,045,000, or 41.6 per cent, it was surpassed by Illinois.

Persons engaged in the industry.—Table 3 shows, for 1914 and 1909, the number of persons engaged in the industry, distributed by sex, and the average number of wage earners, distributed by age. The sex and age classification of the average number of wage earners in this and other tables is an estimate obtained by the method described in the "Explanation of terms."

Table 3

CLASS.	Census year.	PERSONS ENGAGED IN THE INDUSTRY. Total.	Male.	Female.	Per cent of total. Male.	Female.
All classes	1914	144,712	114,742	29,970	79.3	20.7
	1909	105,600	81,616	23,984	77.3	22.7
Proprietors and officials	1914	4,246	4,164	82	98.1	1.9
	1909	4,121	4,055	66	98.4	1.6
Proprietors and firm members	1914	368	357	11	97.0	3.0
	1909	439	428	11	97.5	2.5
Salaried officers of corporations	1914	1,165	1,129	36	96.9	3.1
	1909	997	979	18	98.2	1.8
Superintendents and managers	1914	2,713	2,678	35	98.7	1.3
	1909	2,685	2,648	37	98.6	1.4
Clerks and other subordinate salaried employees	1914	22,388	16,325	6,063	72.9	27.1
	1909	14,223	10,431	3,792	73.3	26.7
Wage earners (average number)	1914	118,078	94,253	23,825	79.8	20.2
	1909	87,256	67,130	20,126	76.9	23.1
16 years of age and over	1914	117,364	93,836	23,528	80.0	20.0
	1909	86,453	66,622	19,831	77.1	22.9
Under 16 years of age	1914	714	417	297	58.4	41.6
	1909	803	508	295	63.3	36.7

The average number of persons engaged in the industry during 1914 was 144,712, of whom 118,078, or 81.6 per cent, were wage earners; 4,246, or 2.9 per cent, proprietors and officials; and 22,388, or 15.5 per cent, clerks, this class including other subordinate salaried employees. While 29,970 females were employed in this industry, 79.3 per cent of the total for 1914 were males. The largest number of females (23,825) were wage earners and they formed 20.2 per cent of the total number in this class. The largest proportion of females, 27.1 per cent, is shown for clerks and other subordinate salaried employees. The proportion of females of all classes decreased from 22.7 per cent in 1909 to 20.7 per cent in 1914.

The average number of wage earners, as reported at the censuses of 1914, 1909, and 1904, is given, by states, in Table 31, and Table 32 gives, for 1914, the distribution by sex of the number employed on December 15, or the nearest representative day, for the individual states. Female wage earners were reported in 24 of the states, the largest number, 4,291, being reported in New Jersey, and the next largest number, 3,424, in Massachusetts. Most of the wage earners under 16 years of age were reported from Connecticut, Pennsylvania, Massachusetts, New York, and New Jersey, in the order named.

Table 4 gives, for the several classes of persons engaged in the industry, the percentages of increase from 1909 to 1914 and the per cent distribution at the two censuses.

With the exception of proprietors and firm members and wage earners under 16 years of age, there was an increase in the number reported for each class shown in Table 4. The largest ratio of increase is shown for clerks and other subordinate salaried employees, and of the three main classes of employees, this is the only one that shows an increased proportion of the total both in the total number of such employees and as reported separately by sex. Though small the number and proportion of female proprietors and officials increased significantly. For all classes combined and for every other class, except that of wage earners under 16 years of age, the greatest increases during the five-year period are shown for the number of males.

Table 4

CLASS.	PERSONS ENGAGED IN THE INDUSTRY.								
	Per cent of increase,[1] 1909–1914.			Per cent distribution.					
	Total.	Male.	Female.	Total.		Male.		Female.	
				1914	1909	1914	1909	1914	1909
All classes	37.0	40.6	24.9	100.0	100.0	100.0	100.0	100.0	100.0
Proprietors and officials	3.0	2.7	.....	2.9	3.9	3.6	5.0	0.3	0.3
Proprietors and firm members	−16.2	−16.6	.....	0.2	0.4	0.3	0.5	[2]	[2]
Salaried officers of corporations	16.8	15.3	.....	0.8	0.9	1.0	1.2	0.1	0.1
Superintendents and managers	1.0	1.1	.....	1.9	2.5	2.3	3.2	0.1	0.2
Clerks and other subordinate salaried employees	57.4	56.5	59.9	15.5	13.5	14.2	12.8	20.2	15.8
Wage earners (average number)	35.3	40.4	18.4	81.6	82.6	82.1	82.3	79.5	83.9
16 years of age and over	35.8	40.8	18.6	81.1	81.9	81.8	81.6	78.5	82.7
Under 16 years of age	−11.1	−17.9	0.7	0.5	0.8	0.4	0.6	1.0	1.2

[1] A minus sign (−) denotes decrease; percentages are omitted where base is less than 100.

[2] Less than one-tenth of 1 per cent.

In order to compare the distribution of the persons engaged in the industry in 1914 and 1909 according to occupational status with that in 1904, it is necessary to use the classification employed at the earlier census. Such a comparison is made in Table 5. During the decade the ratio of increase in salaried employees exceeded that of any other classes for which figures are given in Table 5.

Table 5

CLASS.	PERSONS ENGAGED IN THE INDUSTRY.							
	Number.			Per cent distribution.			Per cent of increase.[1]	
	1914	1909	1904	1914	1909	1904	1909–1914	1904–1909
Total	144,712	105,600	71,485	100.0	100.0	100.0	37.0	47.7
Proprietors and firm members	368	439	400	0.2	0.4	0.6	−16.2	9.8
Salaried employees	26,266	17,905	10,619	18.2	17.0	14.9	46.7	68.6
Wage earners (average)	118,078	87,256	60,466	81.6	82.6	84.6	35.3	44.3

[1] A minus sign (−) denotes decrease.

Table 6 shows, for 1914, 1909, and 1904, the average number and per cent distribution of wage earners classified according to age periods, and in the case of those 16 years of age and over, according to sex.

Table 6

	AVERAGE NUMBER OF WAGE EARNERS IN THE INDUSTRY.					
	1914		1909		1904	
	Number.	Per cent distribution.	Number.	Per cent distribution.	Number.	Per cent distribution.
Total	118,078	100.0	87,256	100.0	60,466	100.0
16 years of age and over	117,364	99.4	86,453	99.1	59,878	99.0
Male	93,836	79.5	66,622	76.4	48,976	81.0
Female	23,528	19.9	19,831	22.7	10,902	18.0
Under 16 years of age	714	0.6	803	0.9	588	1.0

Comparative statistics for the three census periods indicate the continuation of a tendency manifested

at the earlier census, and modify the deductions made from Table 4 with regard to the relative proportion of adult male and female wage earners, due to the unusual increase in the number of women and children reported for 1909. Table 6 indicates a higher ratio of increase as well as an increased proportion in the number of female than of male wage earners 16 years of age and over during the decade 1904–1914. Wage earners under 16 years of age have never been employed to any extent in the electrical industry and during the decade, in which the average number of wage earners nearly doubled, the proportion formed by this class has steadily diminished, until in 1914 it amounted to only six-tenths of 1 per cent of the total average number.

Wage earners employed, by months.—The following table gives for the industry the total number of wage earners employed on the 15th of each month, or nearest representative day, for 1914 and 1909, and the average number employed during each month in 1904, together with the percentage which the number reported for each month forms of the greatest number reported for any month.

The largest number of wage earners employed during any month of 1914 was 128,766 in January. The number decreased month by month, the smallest number, 107,277, being reported for December, and equal to 83.3 per cent of the maximum number. The reverse of this condition is shown for 1909, when the minimum number (77,444) was reported for January and the employment increased monthly, the maximum (99,239) being reported for November. The variation in the number employed was greater in 1909 than in 1914, the minimum number forming 78 and 83.3 per cent, respectively, for the two years, of the maximum.

Table 7

MONTH.	WAGE EARNERS IN THE INDUSTRY.					
	Number.[1]			Per cent of maximum.		
	1914	1909	1904	1914	1904	1904
January	128,766	77,444	62,181	100.0	78.0	100.0
February	126,610	79,193	60,971	98.3	79.8	98.1
March	126,240	80,779	60,714	98.0	81.4	97.6
April	123,742	81,699	60,633	96.1	82.3	97.5
May	120,956	83,229	60,092	93.9	83.9	96.6
June	118,743	85,117	60,025	92.2	85.8	96.5
July	116,340	86,080	59,664	90.3	86.7	96.0
August	115,347	88,133	59,265	89.6	88.8	95.3
September	113,768	91,822	59,434	88.4	92.5	95.6
October	110,944	95,496	60,239	86.2	96.2	97.0
November	108,203	99,239	60,998	84.0	100.0	98.1
December	107,277	98,868	61,326	83.3	99.6	98.6

[1] The figures for 1914 and 1909 represent the number employed on the 15th of each month, for the nearest representative day; those for 1904, the average number employed during the month.

Table 8 gives the total average number of wage earners employed together with the total number employed on the 15th day of each month, or nearest representative day, for each state in which the average number of wage earners was 500 or more in 1914.

Table 8

WAGE EARNERS: 1914.
[Month of maximum employment for each state is indicated by **boldface** figures and that of minimum by *italic* figures.]

STATE.	Average number employed during year.	Number employed on 15th day of the month or nearest representative day.												Per cent minimum is of maximum.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
United States	118,078	**128,766**	126,610	126,240	123,742	120,956	118,743	116,340	115,347	113,768	110,944	108,203	*107,277*	83.3
California	780	*671*	730	799	818	887	879	866	814	760	716	709	711	75.6
Connecticut	5,059	5,015	5,294	5,407	5,220	5,094	5,070	4,983	4,914	*4,873*	4,979	4,978	4,881	90.1
Illinois	16,483	**18,186**	18,133	17,780	17,350	17,025	16,751	16,419	16,194	15,989	15,415	14,556	*14,018*	77.1
Indiana	4,075	4,802	4,839	4,786	4,597	4,405	4,195	4,016	3,757	3,674	3,318	3,268	*3,253*	67.4
Massachusetts	17,125	**18,644**	18,203	18,460	18,110	17,855	17,567	17,060	16,845	16,602	15,799	15,229	*15,186*	81.1
Michigan	1,144	1,192	1,149	1,158	1,216	**1,232**	1,185	1,164	1,108	*1,086*	1,046	1,105	1,127	81.9
Missouri	2,560	**2,856**	2,740	2,729	2,705	2,648	2,566	2,662	2,540	2,320	2,382	2,298	*2,274*	79.6
New Jersey	14,405	**16,208**	15,736	15,634	15,327	14,990	14,603	14,082	13,417	13,156	*13,009*	13,204	13,494	80.3
New York	23,738	**26,336**	25,859	25,551	24,903	24,217	23,445	23,141	22,720	22,677	*22,035*	22,058	21,924	83.7
Ohio	12,695	**13,819**	13,040	13,175	13,081	12,602	12,737	12,357	12 587	12,379	12,571	12,104	*11,888*	86.0
Pennsylvania	14,866	15,349	15,206	15,208	15,075	14,753	14,639	14,614	15,458	**15 482**	14,889	13,907	*13,813*	89.2
Rhode Island	1,581	**1,845**	1,796	1,809	1,671	1,622	1,548	1,529	1.549	1,464	1,406	1,368	*1,365*	74.0
Wisconsin	2,115	2,307	**2,332**	2,209	2,189	2,127	2,085	2,046	2,061	*1,987*	1,995	2,027	2,015	85.2

The same degree of constancy of employment shown by the total for the United States did not prevail in all of the states. The greatest variation in employment is shown for Indiana, where the minimum number formed 67.4 per cent of the maximum. The greatest regularity in the number is shown for Connecticut, where the minimum formed 90.1 per cent of the maximum. In 7 of the 13 states shown in the table the month of maximum employment was January, and in 7 states the month of minimum employment was December.

The months of maximum and minimum employment for 1914 and the number of wage earners reported for such months are given for all states for which separate statistics are presented in Table 32.

Prevailing hours of labor.—In Table 9 the average number of wage earners reported for 1914 and 1909 for the industry has been classified according to the number of hours of labor per week prevailing in the establishments in which they were employed. The number employed in each establishment was classified as a total, even though a few employees worked a greater or less number of hours.

Table 9 — STATE.	Census year.	AVERAGE NUMBER OF WAGE EARNERS. Total.	In establishments where the prevailing hours of labor per week were— 48 and under.	Between 48 and 54.	54.	Between 54 and 60.	60.	Between 60 and 72.	72.	Over 72.
United States	1914	118,078	4,078	30,529	38,838	41,715	2,899	19	....	....
	1909	87,256	1,114	13,909	20,781	45,538	5,874	....	34	6
California [1]	1914	780	224	152	364	40	....	....	....	....
	1909	435	133	75	199	27	1	....	....	....
Connecticut	1914	5,059	4	695	735	3,625	....	....	....	....
	1909	3,505	7	....	592	2,633	273	....	....	....
Illinois	1914	16,483	352	14,680	750	697	14	....	....	....
	1909	9,641	186	8,172	734	453	90	....	....	6
Indiana	1914	4,075	1,026	117	6	2,854	73	....	....	....
	1909	3,073	17	164	184	1,772	936	....	....	....
Massachusetts	1914	17,125	637	2,206	10,519	3,763	1	....	....	....
	1909	14,507	266	395	902	12,851	93	....	....	....
Michigan	1914	1,144	73	118	471	277	205	....	....	....
	1909	1,218	4	26	236	310	642	....	....	....
Missouri	1914	2,560	329	424	1,751	52	4	....	....	....
	1909	1,060	27	239	636	150	8	....	....	....
New Jersey	1914	14,405	262	3,638	4,878	5,223	404	....	....	....
	1909	11,099	147	107	4,160	6,561	104	....	20	....
New York	1914	23,738	348	3,823	3,703	15,145	696	18	....	....
	1909	18,972	164	2,769	2,170	13,048	821	....	....	....
Ohio	1914	12,695	657	3,850	4,098	3,795	295	....	....	....
	1909	8,073	20	1,086	2,430	3,071	1,452	....	14	....
Pennsylvania	1914	14,866	60	458	10,331	3,621	396	....	....	....
	1909	11,025	12	705	7,853	1,772	683	....	....	....
Rhode Island	1914	1,581	.....	34	417	595	535	....	....	....
	1909	1,601	1	6	158	1,409	27	....	....	....
Wisconsin	1914	2,115	3	56	685	1,345	26	....	....	....
	1909	1,409	7	41	351	939	71	....	....	....

The figures emphasize the tendency toward a shortening of the hours of employment of wage earners. Nearly two-thirds (62.2 per cent) of the wage earners employed in the industry in 1914 were in establishments where the prevailing number of hours per week was either 54 or less, as compared with 41 per cent in establishments with these prevailing hours in 1909. In 1914 establishments where the prevailing hours of labor were between 54 and 60 per week gave employment to 35.3 per cent of all wage earners, while establishments where the prevailing hours were 60 or more per week employed only 2.5 per cent. For 1909 the corresponding groups showed far larger proportions of wage earners working longer hours, the percentages being 52.2 and 6.8, respectively.

The group showing the largest number of wage earners at both censuses was that representing establishments where the prevailing hours of labor were between 54 and 60 per week, but only 41,715 wage earners were reported in this group for 1914 as compared with 45,538 in 1909. This group represents the most prevalent working time in Connecticut, Indiana, New Jersey, New York, Rhode Island, and Wisconsin, reporting in combination 28,787, or 56.5 per cent, of the wage earners in these states employed at these prevailing hours. The group working 54 hours was most important in six of the states, California, Massachusetts, Michigan, Missouri, Ohio, and Pennsylvania reporting 27,534, or 56 per cent, of their wage earners at those prevailing hours. In Illinois 89.1 per cent of all the wage earners in the industry are found in the 48–54 hour group.

Character of ownership.—Table 10 presents statistics concerning the character of ownership, or legal organization, of establishments in the industry, for 1914, 1909, and 1904.

Table 10 — CHARACTER OF OWNERSHIP.	NUMBER OF ESTABLISHMENTS. 1914	1909	1904	VALUE OF PRODUCTS. 1914	1909	1904
Total	1,030	1,009	784	$335,170,194	$221,308,563	$149,809,369
Individual	196	178	153	6,469,529	4,908,989	4,738,594
Corporations	753	720	524	326,501,635	213,088,053	133,777,339
All others	81	111	107	2,199,030	3,411,521	2,293,436
Per cent of total	100.0	100.0	100.0	100.0	100.0	100.0
Individuals	19.0	17.6	19.5	1.9	2.2	3.4
Corporations	73.1	71.4	66.8	97.4	96.3	95.0
All others	7.9	11.0	13.6	0.7	1.5	1.6

Establishments owned by corporations constituted 73.1 per cent of the total number of establishments reported, and the value of their products represented 97.4 per cent of the total value in 1914, 96.3 per cent in 1909, and 95 per cent in 1904.

In 1914, 97.5 per cent of the total number of wage earners were employed in establishments owned by corporations, 1.9 per cent in those under individual ownership, and but six-tenths of 1 per cent in those under other forms of ownership, chiefly firms.

Table 11 gives statistics for establishments under each form of ownership, for 1914 and 1909, and for 1914 only for such states as reported an average of 500 wage earners or more.

Table 11

STATE.	NUMBER OF ESTABLISHMENTS OWNED BY—			AVERAGE NUMBER OF WAGE EARNERS.						VALUE OF PRODUCTS.		
				Total.	In establishments owned by—			Per cent of total.			Total.	Of establishments owned by—	
	Individuals.	Corporations.	All others.		Individuals.	Corporations.	All others.	Individuals.	Corporations.	All others.		Individuals.	Corporations.
United States:													
1914	196	753	81	118,078	2,240	115,085	753	1.9	97.5	0.6	$335,170,194	$6,469,529	$326,501,635
1909	178	720	111	87,256	1,692	84,397	1,167	2.0	96.7	1.3	221,308,563	4,808,969	213,068,053
California	7	20	2	780	[1] 35	745	.....	[1] 4.5	95.5	.....	2,861,653	[1] 104,696	2,756,957
Connecticut	5	33	.....	5,059	23	5,036	.....	0.5	99.5	.....	14,330,156	125,908	14,204,248
Illinois	27	108	12	16,483	125	16,286	72	0.8	98.8	0.4	45,667,456	265,105	45,171,971
Indiana	4	35	2	4,075	[1] 22	4,053	.....	[1] 0.5	99.5	.....	8,879,178	[1] 51,158	8,828,020
Massachusetts	20	67	4	17,125	260	16,812	53	1.5	98.2	0.3	43,869,294	[1] 793,483	42,987,503
Michigan	7	26	2	1,144	[1] 50	1,094	.....	[1] 4.4	95.6	.....	3,415,500	[1] 99,993	3,315,507
Missouri	7	12	.....	2,560	321	2,239	.....	12.5	87.5	.....	6,643,210	359,782	6,283,428
New Jersey	12	58	6	14,405	169	14,144	92	1.2	98.2	0.6	40,740,810	615,547	39,706,778
New York	50	151	14	23,738	553	23,079	106	2.3	97.2	0.5	73,944,708	1,637,412	71,900,474
Ohio	20	87	12	12,695	88	12,482	125	0.7	98.3	1.0	36,120,978	257,038	35,520,772
Pennsylvania	16	73	16	14,866	480	14,233	153	3.2	95.8	1.0	44,395,789	1,958,552	42,071,501
Rhode Island	2	10	1	1,581	[1] 36	1,545	.....	[1] 2.3	97.7	.....	5,468,065	[1] 77,207	5,390,858
Wisconsin	4	24	1	2,115	[1] 14	2,101	.....	[1] 0.7	99.3	.....	5,396,802	[1] 52,264	5,344,538

STATE.	VALUE OF PRODUCTS—continued.				VALUE ADDED BY MANUFACTURE.					
	Of establishments owned by—continued.	Per cent of total.			Total.	Of establishments owned by—			Per cent of total.	
	All others.	Individuals.	Corporations.	All others.		Individuals.	Corporations.	All others.	Individuals.	Corporations.	All others.
United States:											
1914	$2,199,030	1.9	97.4	0.7	$180,442,118	$3,251,636	$176,021,621	$1,168,861	1.8	97.6	0.6
1909	3,411,521	2.2	96.3	1.5	112,742,159	2,577,833	108,307,076	1,857,250	2.3	96.1	1.6
California	.....	[1] 3.6	96.4	.....	1,301,395	[1] 60,404	1,240,991	.....	[1] 4.6	95.4	.....
Connecticut	.....	0.9	99.1	.....	6,894,026	42,025	6,852,001	.....	0.6	99.4	.....
Illinois	230,380	0.6	98.9	0.5	26,288,292	170,889	25,965,450	151,953	0.6	98.8	0.6
Indiana	.....	[1] 0.6	99.4	.....	4,948,531	[1] 31,239	4,917,292	.....	[1] 0.6	99.4	.....
Massachusetts	128,308	1.8	97.9	0.3	26,172,387	315,957	25,808,632	52,798	1.2	98.6	0.2
Michigan	.....	[1] 2.9	97.1	.....	1,675,952	[1] 57,356	1,618,596	.....	[1] 3.4	96.6	.....
Missouri	.....	5.4	94.6	.....	4,227,457	229,727	3,997,730	.....	5.4	94.6	.....
New Jersey	418,485	1.5	97.5	1.0	20,191,534	356,309	19,664,772	170,453	1.8	97.4	0.8
New York	316,822	2.2	97.4	0.4	35,919,949	1,033,110	34,691,928	194,911	2.9	96.6	0.5
Ohio	343,168	0.7	98.3	1.0	18,638,730	152,222	18,295,482	191,026	0.8	98.2	1.0
Pennsylvania	365,736	4.4	94.8	0.8	27,155,769	690,848	26,254,089	210,832	2.5	96.7	0.8
Rhode Island	.....	[1] 1.4	98.6	.....	1,674,995	[1] 42,733	1,632,262	.....	[1] 2.5	97.5	.....
Wisconsin	.....	[1] 1.0	99.0	.....	3,333,082	[1] 17,724	3,315,358	.....	[1] 0.5	99.5	.....

[1] Includes "all others."

Size of establishments.—The tendency of the industry to become concentrated in large establishments is indicated by the statistics given in Table 12.

Establishments with products valued at $1,000,000 and over were the only class which increased in every particular not only as to actual numbers and amounts but in the percentages which these formed of the totals for the industry.

Of the 1,030 establishments reported for 1914, 53 manufactured products valued at $1,000,000 or over. In 1909 there were 31 establishments of this class out of a total of 1,009; and in 1904, 22 out of 784. While such establishments represented but a comparatively small proportion of the total number at each census, they reported 67.5 per cent of the total value of products in 1914, 57.1 per cent in 1909, and 60.5 per cent in 1904.

The average value of products per establishment increased from $179,604 in 1904 to $219,335 in 1909, and to $325,408 in 1914, and the average value added by manufacture, as computed from the figures in Table 1, from $94,353 in 1904 to $111,737 in 1909, and to $175,186 in 1914.

Table 12

VALUE OF PRODUCT.	Census year.	Number of establishments.	Average number of wage earners.	Value of products.	Value added by manufacture.
All classes	1914	1,030	118,078	$335,170,194	$180,442,118
	1909	1,009	87,256	221,308,563	112,742,159
Less than $5,000	1914	156	204	440,280	254,658
	1909	150	256	395,175	234,853
$5,000 to $20,000	1914	249	1,329	2,785,685	1,715,664
	1909	287	1,473	3,209,873	1,924,861
$20,000 to $100,000	1914	292	5,867	14,211,891	7,951,750
	1909	309	6,474	14,715,392	8,456,335
$100,000 to $1,000,000	1914	280	33,223	91,529,234	49,290,339
	1909	232	28,108	76,612,783	41,436,270
$1,000,000 and over	1914	53	77,455	226,203,104	121,229,707
	1909	31	50,925	126,375,340	60,689,810
Per cent distribution:					
Less than $5,000	1914	15.1	0.2	0.1	0.1
	1909	14.9	0.3	0.2	0.2
$5,000 to $20,000	1914	24.2	1.1	0.8	1.0
	1909	28.4	1.7	1.5	1.7
$20,000 to $100,000	1914	28.4	5.0	4.2	4.4
	1909	30.6	7.4	6.6	7.5
$100,000 to $1,000,000	1914	27.2	28.1	27.3	27.3
	1909	23.0	32.2	34.6	36.8
$1,000,000 and over	1914	5.1	65.6	67.5	67.2
	1909	3.1	58.4	57.1	53.8

Table 13 shows the size of establishments in 1914 and 1909, as measured by the number of wage earners employed, for the industry as a whole, and for the 13 leading states.

Table 13

STATE.	Census year.	TOTAL.		ESTABLISHMENTS EMPLOYING—															
				No wage earners.	1 to 5 wage earners.		6 to 20 wage earners.		21 to 50 wage earners.		51 to 100 wage earners.		101 to 250 wage earners.		251 to 500 wage earners.		501 to 1,000 wage earners.		Over 1,000 wage earners.	
		Establishments.	Wage earners (average number).	Establishments.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.	Establishments.	Wage earners.
United States	1914	1,090	118,078	35	307	831	263	3,108	150	4,720	98	6,980	95	15,031	45	15,183	20	13,874	17	58,351
	1909	1,009	87,256	22	333	893	274	3,095	152	4,867	91	6,490	90	14,212	27	9,673	9	6,119	11	41,907
California[1]	1914	29	780	2	11	30	11	107	2	55	.....	.....	2	262	1	326	.....	.....	.....	.....
Connecticut	1914	43	5,059	1	11	38	6	75	3	101	2	131	15	2,589	4	1,210	1	915	.....	.....
	1909	41	3,505	1	11	39	5	53	5	153	4	339	13	1,975	1	371	1	570	.....	.....
Illinois	1914	142	16,483	5	46	122	39	491	23	693	12	802	12	1,716	2	740	1	612	2	11,307
	1909	143	9,641	5	55	145	42	469	17	529	14	966	6	699	1	437	1	665	2	5,731
Indiana	1914	41	4,075	2	9	32	10	105	7	246	6	358	4	585	1	460	1	967	1	1,322
	1909	42	3,073	.....	13	24	9	87	7	225	7	534	3	480	2	854	1	869	.....	.....
Massachusetts	1914	91	17,125	1	22	51	25	323	14	429	13	920	6	1,081	7	2,125	1	693	2	11,503
	1909	83	14,507	2	14	40	22	271	19	664	11	841	10	1,754	3	1,070	.....	.....	2	9,867
Michigan	1914	35	1,144	2	14	45	4	54	7	202	5	342	3	501	.....	.....	.....	.....	.....	.....
	1909	40	1,218	2	14	31	12	117	7	238	1	51	3	431	1	350	.....	.....	.....	.....
Missouri	1914	19	2,560	.....	8	22	4	47	2	57	.....	.....	.....	.....	4	1,329	.....	.....	1	1,105
	1909	20	1,060	.....	7	23	7	76	.....	.....	1	54	4	568	1	340	.....	.....	.....	.....
New Jersey	1914	76	14,405	2	15	36	13	140	11	343	9	688	11	1,789	7	2,780	5	3,405	3	5,224
	1909	69	11,099	.....	11	34	28	293	14	479	3	226	7	1,213	6	2,161	2	1,297	3	5,396
New York	1914	215	23,738	8	74	189	60	674	23	697	20	1,492	18	2,816	7	2,057	3	1,986	2	13,827
	1909	217	18,972	4	86	224	64	677	28	848	16	1,147	15	2,327	1	457	1	638	2	12,654
Ohio	1914	119	12,695	4	40	116	24	284	16	583	10	662	11	1,827	6	2,121	4	2,482	4	4,620
	1909	115	8,073	1	35	79	29	337	15	448	12	834	15	2,446	6	1,944	1	809	1	1,176
Pennsylvania	1914	105	14,866	2	28	83	33	403	15	437	11	877	9	1,281	4	1,354	1	988	2	9,443
	1909	84	11,025	4	20	59	24	293	14	444	10	678	8	1,294	2	637	1	537	1	7,063
Rhode Island	1914	13	1,581	1	2	5	2	18	4	117	.....	.....	1	225	2	681	1	535	.....	.....
	1909	12	1,601	.....	4	10	1	6	2	53	.....	.....	3	500	1	298	1	734	.....	.....
Wisconsin	1914	29	2,115	1	5	8	9	127	7	264	4	270	1	155	.....	.....	2	1,291	.....	.....
	1909	30	1,409	.....	13	41	7	79	5	189	2	124	1	222	2	754	.....	.....	.....	.....

[1] Less than 500 wage earners in 1909.

There were 35 establishments which reported no wage earners in 1914. These were small establishments in which the work was done by the proprietors or firm members. In some cases they employ one or two wage earners for short periods, but the number is so small and the period so short that in computing the average number, as described in the "Explanation of terms," no wage earners could be shown for the establishment. Of the remainder, 29.8 per cent employed from 1 to 5 wage earners; 25.5 per cent from 6 to 20; 24.1 per cent from 21 to 100; 13.6 per cent from 101 to 500; and only 3.6 per cent more than 500.

Of the total number of wage earners, 61.2 per cent worked in establishments employing over 500 each in 1914 and 55 per cent in 1909; the 17 establishments in 1914 and the 11 in 1909, in which more than 1,000 wage earners were employed, reported 49.4 per cent and 48 per cent, respectively, of the total number of wage earners. Establishments employing 501 to 1,000 wage earners embraced 11.7 per cent of all wage earners in 1914 and 7 per cent in 1909; those employing 101 to 500 wage earners, 25.6 per cent in 1914 and 27.4 per cent in 1909; those employing 21 to 100, 9.9 per cent in 1914 and 13 per cent in 1909; those employing 20 or less, 3.3 per cent in 1914 and 4.6 per cent in 1909. The proportionate growth is in the large plants, or those employing over 250 wage earners.

Expenses.—The census figures for expenses do not purport to show the total cost of manufacture, since they take no account of miscellaneous expense, particularly of interest or depreciation; hence they can not properly be used for determining profits. Facts of interest can be brought out, however, concerning the relative importace of the different classes of expenses which were reported.

Table 1 shows the total reported expenses in 1914 to have been $267,403,445, distributed as follows: Cost of materials $154,728,076, or 57.9 per cent; wages $73,806,329, or 27.6 per cent; salaries $35,291,281, or 13.2 per cent; rent and taxes $3,286,870, or 1.2 per cent; and contract work $290,889, or one-tenth of 1 per cent. In 1909 the corresponding percentages were materials 60.1; wages 27.4; salaries 11.2; and rent, taxes, and contract work 1.3; and in 1904, materials 60; wages 28.6; salaries 10; and rent, taxes, and contract work 1.4. Naturally there are variations in the states owing to differences in the class of products. The proportion which the cost of materials

forms of the total expenses reported ranged, among the six leading states in 1914, from 51.9 per cent in Illinois to 62.3 per cent in New York.

Engines and power.—Table 14 shows, for 1914, 1909, and 1904, for the industry, the number and total horsepower of engines or motors employed in generating power (including electric motors operated by purchased current). It also shows separately the number and horsepower of electric motors operated by current generated in the establishments reporting.

Table 14

POWER.	NUMBER OF ENGINES OR MOTORS.			HORSEPOWER. Amount.			Per cent distribution.		
	1914	1909	1904	1914	1909	1904	1914	1909	1904
Primary power, total	17,572	6,596	2,896	227,731	158,768	105,376	100.0	100.0	100.0
Owned	550	601	565	151,844	107,764	81,180	66.7	67.9	77.0
Steam engines and turbines [1]	350	410	395	142,085	99,897	77,059	62.4	62.9	73.1
Internal-combustion engines	181	166	111	8,694	6,753	2,940	3.8	4.3	2.8
Water wheels, turbines, and motors	19	25	59	1,065	1,114	1,181	0.5	0.7	1.1
Rented	17,022	5,995	2,331	75,887	51,004	24,196	33.3	32.1	23.0
Electric	17,022	5,995	2,331	74,476	50,045	21,313	32.7	31.5	20.2
Other	.....	.....	.....	1,411	959	2,883	0.6	0.6	2.7
Electric	39,568	22,650	8,472	262,119	164,540	61,753	100.0	100.0	100.0
Rented	17,022	5,995	2,331	74,476	50,045	21,313	28.4	30.4	34.5
Generated by establishments reporting	22,546	16,655	6,141	187,643	114,495	40,440	71.6	69.6	65.5

[1] Figures for horsepower include for 1909 and 1904 the amounts reported under the head of "other" owned power.

The total primary power increased from 105,376 horsepower in 1904 to 227,731 horsepower in 1914, or 116.1 per cent for the decade. Steam engines still supply the greater part of the primary power, although such power represented a smaller proportion of the total primary power in 1914 than in 1904. Some part of this proportionate decrease is due to the large increase in rented electric power.

The horsepower of electric motors used for distributing power increased from 40,440 in 1904 to 187,643 in 1914. The electric power as given in these tables is the total of electric motor installations in the various establishments, whether run with purchased or generated current; and because of the modern practice of direct drive instead of shaft drive, their capacity in the aggregate exceeds that of the primary power in many cases.

Fuel consumed.—Table 15 shows, for 1914, the quantity of each kind of fuel used, for which data were obtained, for the industry as a whole and for 13 separate states.

Bituminous coal was the principal fuel used. Gas and oil were also used to a considerable extent, the largest quantity of the former being reported from Ohio and of the latter for New York.

Table 15

STATE.	COAL. Anthracite (tons, 2,240 lbs.).	COAL. Bituminous (tons, 2,000 lbs.)	Coke, (tons, 2,000 lbs.).	Oil, including gasoline (barrels).	Gas (1,000 cubic feet).
United States	66,841	769,260	26,378	125,523	2,767,856
California	.....	60	3	5,402	3,329
Connecticut	3,074	24,686	27	398	16,103
Illinois	159	79,135	6,319	4,970	326,637
Indiana	1,136	24,515	6,000	3,473	7,984
Massachusetts	1,496	117,165	4,407	18,402	50,431
Michigan	15	3,974	306	559	6,771
Missouri	4	8,799	30	951	19,261
New Jersey	29,592	44,084	50	2,930	107,306
New York	21,362	251,332	3,880	51,168	142,062
Ohio	81	59,496	1,257	5,407	1,094,338
Pennsylvania	3,155	122,889	2,913	26,768	433,817
Rhode Island	6,612	12,189	54	4,207	19,426
Wisconsin	50	17,156	1,095	628	98,403

SPECIAL STATISTICS RELATING TO PRODUCTS.

The foregoing tables give the general statistics for establishments engaged primarily in the manufacture of electrical machinery, apparatus, and supplies. There is, however, a considerable production of such commodities by establishments engaged primarily in other lines of manufacture, and the general-statistics for them are included with those for other branches of industry. In the following tables pertaining to products the total production is given, including that made as a subsidiary product in establishments classed under other industries.

Table 16 summarizes the statistics, for 1914, 1909, 1904, and 1899, relative to the different kinds or groups of electrical machinery, apparatus, and supplies, for which separate totals were compiled at the census of 1914.

The statistics given in Table 16 do not include porcelain electrical supplies manufactured in the clay-working industries, reported by the United States Geological Survey, to the value of $4,130,270 for 1914, nor the value of 10,461,843 dozen globes and 79,211 gross of battery jars accredited to the glass industry.

In comparing statistics at the different censuses allowance should be made, particularly in the case of some of the less distinctive products, for changes in the schedule of inquiry used, and for the fact that it

is possible that all manufacturers did not classify their products in the same way. It is highly probable that many articles specifically called for were not reported separately, and are included in the item "all other electrical machinery, apparatus, and supplies."

Table 16

	1914	1909	1904	1899
Products, total value	$350,432,155	$240,037,479	$159,551,402	$105,831,865
The electrical industry—Electrical machinery, apparatus, and supplies	335,170,194	221,308,563	140,809,369	92,434,435
Subsidiary electrical products of other industries	24,261,961	18,728,916	18,742,033	13,397,430
Dynamos	23,233,437	17,231,804	12,824,768	10,852,323
Transformers	13,120,065	8,801,019	4,468,567	2,962,871
Rheostats, resistances, controllers, motor-starting and speed-controlling devices, feeder-potential regulators, and reactances	9,543,224	[1] 2,674,963	[1] 932,925	[2] 1,186,878
Generator-voltage regulators	245,154	[3]	[3]	[3]
Rectifying apparatus, including rotating commutators, electric valves, mercury rectifiers, and vibrating commutators	147,965	[3]	[3]	[3]
Switchboards, panel boards, and cut-out cabinets for light and power	8,989,111	5,971,804	3,766,044	1,846,624
Motors	44,176,235	32,087,482	22,370,626	19,505,504
Batteries	23,402,455	10,612,470	4,243,893	3,679,045
Storage	13,080,964	4,678,209	2,645,749	2,559,601
Primary	10,321,491	5,934,261	1,598,144	1,119,444
Carbons—Furnace lighting, brushes, battery, and miscellaneous	3,602,741	1,934,864	2,710,935	1,731,248
Arc lamps	742,142	1,706,959	1,574,422	1,827,771
Searchlights, projectors, and focusing lamps	2,081,545	935,874	114,795	225,635
Incandescent lamps	17,350,385	15,714,809	6,953,205	3,515,118
Sockets, receptacles, bases, etc	5,512,609	4,521,729	2,010,880	503,929
Electric-lighting fixtures [4]	3,383,955	2,200,668	3,294,606	3,750,670
Telegraph apparatus	2,248,375	1,957,432	1,111,194	1,642,266
Telephone apparatus	22,815,640	14,259,357	15,863,698	10,512,412
Insulated wire and cables	69,505,573	51,624,737	34,519,699	21,292,001
Electric heating, cooking, and welding apparatus, including flatirons	4,048,915	1,954,112	395,827	[3]
Electric measuring instruments	8,786,506	7,800,010	5,004,763	1,842,135
Electric locomotives, mine and railway	[5] 3,720,914	[3]	[3]	[3]
Electrical therapeutic apparatus	2,653,098	1,107,858	1,036,962	[3]
Magneto-ignition apparatus, spark plugs, coils, etc	22,260,847	6,092,343	678,077	[3]
Electric switches, signals, and attachments	6,393,551	5,377,843	1,451,337	1,129,891
Annunciators	263,806	235,567	185,870	224,885
Electric clocks and time mechanisms	410,774	352,513	373,926	132,149
Electric conduits, underground and interior	4,874,709	5,098,264	2,416,245	1,066,163
Lightning arresters	1,188,773	940,171	587,124	595,497
Fuses	1,757,430	1,001,719	868,079	
Circuit fittings of all kinds	2,067,683	1,080,287	3,525,446	[3]
All other electrical machinery, apparatus, and supplies	27,276,294	18,995,176	26,267,509	15,716,850
All other products, including amount received for custom work and repairing	23,628,244	17,765,645		

[1] Rheostats and resistances only.
[2] Rheostats and resistances, and heating and welding apparatus.
[3] Figures not available.
[4] Not including fixtures made by establishments engaged primarily in the manufacture of "gas and electric fixtures."
[5] Number, 900.

The more important classes of products are treated separately in tables presenting statistics of production in detail.

Table 17 shows, for 1914 and 1909, the value of the various kinds of electrical apparatus included in the totals shown in Table 16, which were manufactured by establishments in other industries as subsidiary products.

Table 17

KIND.	SUBSIDIARY ELECTRICAL PRODUCTS (ESTABLISHMENTS INCLUDED UNDER OTHER INDUSTRY CLASSIFICATIONS). 1914	1909
Number of establishments	91	142
Total value	$24,261,961	$18,728,916
Dynamos and dynamo parts and supplies	1,668,523	2,111,542
Switchboards for light and power	98,098	224,452
Motors and parts and supplies	900,683	1,213,761
Insulated wires and cables	18,183,964	11,374,165
Magneto-ignition apparatus, spark-plugs, coils, etc	105,541	79,183
Electric locomotives	847,370	
Other electrical machinery, apparatus, and supplies	2,321,255	3,691,453
Custom work and repairing	136,527	34,360

Dynamos.—The statistics with regard to dynamos are shown in Table 18.

Table 18

CLASS.	DYNAMOS, PARTS AND SUPPLIES. 1914	1909	1904	1899
Total value	$23,233,437	$17,231,804	$12,824,768	$10,852,323
Alternating current:				
Dynamos—				
Number	2,137			
Kilowatts	587,320			
Value	$3,542,154	2,909	1,324	1,345
Generators for direct connection to steam turbines—		991,728	355,832	256,673
Number	375	$8,370,524	$4,111,104	$4,174,651
Kilowatts	600,185			
Value	$3,895,291			
Direct current:				
Dynamos not elsewhere specified—				
Number	9,369			
Kilowatts	206,305			
Value	$2,569,086			
Generators for direct connection to steam turbines—				
Number	264	13,882	13,756	9,182
Kilowatts	14,916	414,222	640,350	321,451
Value	$398,379	$4,710,524	$6,973,130	$6,297,925
Small dynamos and automobile starter-generator sets [1]—				
Number	208,545			
Value	$5,933,273			
Dynamotors, motor generators, boosters, rotary converters, double-current generators, synchronous condensers, and rotary-phase converters:				
Number	8,393	2,291	2,135	649
Kilowatts	780,009	295,079	209,664	10,798
Value	$5,367,895	$3,154,733	$1,740,534	$379,747
Parts and supplies, value	$1,527,359	$996,023	[2]	[2]

[1] Figures for capacity not available; fraction of kilowatt.
[2] Figures not available.

Dynamotors and machines of an allied character are included in the dynamo group, though they may be classed as transformers. The group also includes a large number of small dynamos of a fraction of a kilowatt capacity and starter-generator sets for automobiles. With respect to the latter, it does not include those made and installed by the automobile manufacturers. The growth in direct-current dynamos has been chiefly confined to the small units. In the aggregate their value, $8,900,738, is a large increase over each of the prior years, but two-thirds of this value is represented by the small dynamos and

starter-generator sets. Alternating-current machines to the number of 2,512, of 1,188,005 kilowatts, and valued at $7,437,445, were reported in 1914, a decrease in number and value of 13.6 per cent and 11.1 per cent, respectively, but an increase of 19.8 per cent in capacity, as compared with 1909.

The average capacity of dynamos of the alternating-current type in 1914 was twelve and one-half times that of direct-current dynamos (other than those used for automobile starting and lighting) at less than half the average cost per kilowatt.

There were 639 generators for direct connection to steam turbines manufactured in 1914, of 615,101 kilowatts, in the aggregate, valued at $4,293,670. These represent 43.6 per cent of the capacity of all dynamos, other than the group of small machines (for which capacity was not reported). The alternating machines are of course in preponderance, the direct-current machines constituting but 2.4 per cent of the kilowatt capacity of the generators of the steam-turbine class, and averaging but 56.5 kilowatts per machine, while the alternating-current machines average 1,600 kilowatts. The figures for dynamotors and machines of an allied character may not be strictly comparable as reported for the different censuses as some types may have been included by manufacturers at the last census that were otherwise reported at the earlier censuses. The figures for 1914 indicate an increase of 164.3 per cent in kilowatts and 70.2 per cent in value over 1909.

Transformers.—Table 19 shows the statistics for transformers for 1914, 1909, 1904, and 1899.

Table 19

CLASS.	Census year.	TRANSFORMERS. Number.	Kilowatts.	Value.
All classes	1914	115,843	2,644,794	$13,120,065
	1909	78,729	1,635,429	8,801,019
	1904	66,698	728,181	4,468,567
	1899	36,513	305,588	[1] 2,962,871
Under 50 kilowatts	1914	110,177	762,707	7,316,615
50 kilowatts and over	1914	5,666	1,882,087	5,803,450
50 to 500 kilowatts	1914	4,857	544,443	2,625,414
500 kilowatts and over	1914	809	1,337,644	3,178,036
Under 50 kilowatts	1909	72,776	577,408	4,184,832
50 kilowatts and over	1909	3,953	1,058,021	4,616,187
Under 50 kilowatts	1904	63,311	350,174	3,292,207
50 kilowatts and over	1904	3,387	378,007	1,176,360

[1] Includes transformers to the value of $2,700 for which number and capacity were not reported.

The increase in the manufacture of transformers in 1914, as compared with 1909, amounted to 51 per cent in number, 61.7 per cent in capacity, and 49.1 per cent in value. The greatest increases in the number and value during this period occurred in the machines of the smaller type, under 50 kilowatt capacity, while 81.6 per cent of the total increase in capacity was reported for transformers of the larger types, 50 kilowatts and over. Transformers under 50 kilowatt capacity increased 51.4 per cent in number, 32.1 per cent in capacity, and 74.8 per cent in value, and were of less average capacity and higher cost per kilowatt in 1914 than in 1909.

The transformers of the larger type apparently became larger and relatively cheaper, the increase for the five years 1909–1914 being 43.3 per cent in number, 77.9 per cent in kilowatts, and only 25.7 per cent in value. At the census of 1914 an effort was made to procure more detailed statistics relating to this class of apparatus, and 809 transformers were reported of 500 kilowatts and over, aggregating in capacity 1,337,644 kilowatts, and valued at $3,178,036, for which no comparable figures for 1909 are available.

Statistics were also collected for the number, capacity, and value of feeder-potential regulators, and reactances for 1914, but as these can not be shown separately, their value has been merged with that of rheostats, resistances, controllers, and motor-starting and speed-controlling devices, with a combined value of $9,543,224, as shown in Table 16. Of this group only rheostats and resistances were reported separately in 1909. Their value was $2,674,963. Generator-voltage regulators were reported to the value of $245,154 for 1914, and vibrating commutators, electric valves, mercury rectifiers, and rotating commutators to the value of $147,965.

Switchboards.—Each system of centralized electrical supply depends upon a switchboard for the manipulation of its circuits and to connect the sources of supply with the consumer. Table 20 shows the value of the switchboards, panel boards, and cut-out cabinets manufactured during 1914, 1909, 1904, and 1899, in 10 of the leading states for which comparable figures are available. New York contributed 61.2 per cent of the entire output in 1914.

Table 20

State.	SWITCHBOARDS, PANEL BOARDS, CUT-OUT CABINETS FOR LIGHT AND POWER, VALUE. 1914	1909	1904	1899
United States	$8,989,111	$5,971,804	$3,766,044	$1,846,624
California	130,162	90,594	27,749	10,000
Connecticut	224,481	151,385	[1]	3,700
Illinois	419,931	448,185	244,590	75,367
Indiana	229,989	117,877	12,700	[1]
Massachusetts	157,961	304,502	468,689	230,602
Minnesota	71,971	48,385	46,250	[1]
New Jersey	122,762	[1]	[1]	[1]
New York	5,505,685	2,789,297	1,373,366	1,055,288
Ohio	237,916	236,930	54,056	21,660
Pennsylvania	1,566,433	1,243,356	1,157,027	353,043
All other states	321,820	541,293	381,617	96,964

[1] Included in "all other states."

Motors.—Table 21 shows the number, capacity, and value of electric motors manufactured in 1914, 1909, 1904, and 1899.

The value of the motors, including parts and supplies, 1914, is an increase of $12,088,753, or 37.7 per cent, over the corresponding figure for 1909. The output of motors for power and railway use in 1914 exceeded that of 1909 by 160,769 in number, or an increase of 62.5 per cent; by 472,435 horsepower in rated capacity, or 19.6 per cent, and by $7,681,211 in

value, or 31.2 per cent. The large percentages of increase shown, however, are entirely owing to the preponderance of motors for industrial power. Railway motors (included with industrial motors, to avoid the disclosure of individual operations) increased in capacity less than 1 per cent.

Table 21 — CLASS.	MOTORS, PARTS AND SUPPLIES.			
	1914	1909	1904	1899
Total value	$44,176,235	$32,087,482	$22,370,626	$19,505,504
For industrial power and railways:				
Number	417,992	257,223	92,175	50,888
Horsepower	2,882,795	2,410,360	1,392,091	1,182,374
Value	$32,286,149	$24,604,938	$18,070,743	$15,120,321
Alternating current—				
Number	284,500	(1)	(1)	(1)
Horsepower	1,901,975	(1)	(1)	(1)
Value	$18,969,660	(1)	(1)	(1)
Direct current—				
Number	133,492	(1)	(1)	(1)
Horsepower	980,820	(1)	(1)	(1)
Value	$13,316,489	(1)	(1)	(1)
For automobiles:				
Number	11,880	2,796	1,819	3,017
Horsepower	36,858	12,471	19,907	8,220
Value	$1,351,442	$294,152	$152,685	$192,030
For fans, value	$4,635,850	$2,450,739	$1,168,254	$1,055,369
For miscellaneous uses, value	$1,190,564	$1,942,874	$2,978,944	$3,137,784
Parts and supplies, value	$4,512,230	$2,794,779	(1)	(1)

[1] Figures not available.

The comparability of the figures for automobile motors are possibly affected by the inclusion of a considerable number of starting motors for gasoline automobiles, not reported separately as such. It is probable that in some cases manufacturers included these under the inquiry for motors for automobiles. According to the returns, 11,880 electric motors for automobiles, of 36,858 horsepower, and valued at $1,351,442, were produced by 10 establishments in 1914, as compared with 2,796, of 12,471 horsepower, and valued at $294,152, manufactured by 7 establishments in 1909.

Batteries.—Table 22 shows the production of storage and primary batteries, parts and supplies, for 1914, 1909, 1904, and 1899.

Table 22 — CLASS.	BATTERIES, PARTS AND SUPPLIES.			
	1914	1909	1904	1899
Total value	$23,402,455	$10,612,470	$4,243,803	$3,679,045
Storage:				
Batteries, value	$10,615,150	$4,243,984	$1,569,371	$2,559,601
Weight of plates, pounds	41,079,047	23,119,331	16,113,072	(1)
Parts and supplies, value	$2,495,814	$434,225	$1,076,378	(1)
Primary:				
Dry—				
Number	71,092,438	33,988,881	4,888,361	1,946,688
Value	$8,719,164	$4,583,082	$513,026	$316,013
Liquid [2]—				
Number	305,351	344,650	1,734,801	708,077
Value	$902,525	$729,513	$515,530	[3]$571,370
Parts and supplies, value	$799,802	$621,666	$569,588	$232,061

[1] Figures not available.
[2] Includes a small number of testing batteries.
[3] Includes $1,500 for which number was not reported.

The value of this group of products in 1914 exceeded that of 1909 by $12,789,985, an increase of 120.5 per cent. The greatest gain was in storage batteries, which in value increased 150.1 per cent, and in weight of plates, 77.7 per cent, during the last census period.

New Jersey led all states in the production of storage batteries, followed by Pennsylvania, Ohio, and New York, in the order named.

The production of dry batteries increased 109.2 per cent in number and 90.2 per cent in value during the five-year period ending with 1914. The figures include a number of small batteries for flash lights. The production of dry batteries has been greatly stimulated by the demand for their use on automobiles and motor boats.

The output of liquid batteries in 1914 shows a decrease of 11.1 per cent in number and an increase of 10.1 per cent in value over the production of similar batteries in 1909. Included in this group are a few testing batteries.

The value of battery supplies and parts reported separately, increased in the aggregate from $1,055,891 in 1909 to $3,265,616 in 1914.

Carbons.—As shown in Table 16 the aggregate value of carbons of all kinds was $3,602,741 in 1914, as compared with $1,934,864 in 1909, an increase of $1,667,877, or 86.2 per cent, for the five years. The manufacture of lighting carbons has declined and the output of furnace carbons increased, so that in 1914 the value of the latter manufacture exceeded that of brushes, etc., while lighting carbons, the division of first importance in this industry in 1900, dropped to last place in 1914.

Arc lamps and searchlights.—Table 23 shows the number and value of arc lamps manufactured in 1914, 1909, 1904, and 1899.

Table 23 — KIND.	ARC LAMPS.			
	1914	1909	1904	1899
Number	35,112	123,985	195,157	158,187
Luminous or metallic arcs	22,846	(1)	(1)	(1)
Flame arcs	4,631	(1)	(1)	(1)
Carbon arcs	7,635	(1)	(1)	(1)
Value	$742,142	$1,706,969	$1,574,422	$1,827,771
Luminous or metallic arcs	441,992	(1)	(1)	(1)
Flame arcs	153,433	(1)	(1)	(1)
Carbon arcs	146,717	(1)	(1)	(1)

[1] Not reported.

The production of arc lamps of all kinds in 1914 shows a decrease of 71.7 per cent in number and 56.5 per cent in value, as compared with the returns for 1909. Comparable statistics for the several kinds of lamps are not available, owing to the different form of inquiry used at the earlier censuses. The arc lamps shown in the table for 1909 comprised 5,004 "open" lamps, valued at $83,660, and 118,981 lamps of the "inclosed" type, valued at $1,623,299.

The value of searchlights, projectors, and focusing lamps shown in Table 16 was $2,081,545 in 1914, an increase of $1,145,671, or 122.4 per cent, over that of 1909.

Incandescent lamps.—The statistics for incandescent lamps, so far as available, are given in Table 24, for 1914, 1909, 1904, and 1899.

Table 24 KIND.	INCANDESCENT LAMPS.			
	1914	1909	1904	1899
Total value	$17,350,385	$15,714,809	$6,953,205	$3,515,118
Tungsten:				
Number	74,434,059	11,738,619	[1] 112,711,558	[1] 25,320,198
Value	$11,886,354	$6,241,133	$6,308,299	$3,442,183
Carbon filament:				
Number	14,092,055	55,038,378		
Value	$1,397,572	$6,157,066		
Gem, vacuum and vapor, nitrogen, glower, and tantalum	$2,363,730	$2,715,991	[2] $395,155	$72,935
Decorative and miniature lamps, X-ray bulbs, vacuum tubes, etc.	$1,702,729	$600,619	$249,751	

	16 c. p.	Below 16 c. p.	Above 16 c. p.
[1] As reported: 1904	83,333,285	19,779,834	9,598,439
1899	21,191,131	2,906,817	1,222,250

[2] Vacuum and vapor and glower lamps.

Tungsten lamps formed 68.5 per cent of the value of all incandescent lamps manufactured in 1914 and 39.7 per cent in 1909, at which time they were first reported. Tantalum lamps were reported by 7 establishments at the census of 1909, but their manufacture had been practically discontinued in 1914. Tungsten lamps were reported by 20 establishments in 1909 and by 28 in 1914. The phenomenal increase in number of tungsten lamps manufactured was accompanied by a reduction in the average unit value from 53 cents per lamp in 1909 to 16 cents in 1914.

The increase in tungsten lamps has been accompanied by a decrease in lamps of the older carbon filament type. Forty-three establishments reported the manufacture of carbon filament lamps in 1909 and only 20 in 1914, the decrease being, for the five years, 74.4 per cent in number and 77.3 per cent in value.

Although the aggregate value of lamps of the gem, vacuum and vapor, nitrogen, glower and tantalum types in 1914 was 13 per cent less than in 1909, the gem lamps included in this group had actually increased by 127.1 per cent in number and 91.4 per cent in value. The decrease in the group is due to the decline of lamps of the tantalum and glower types, which had reached a considerable output in 1909.

Fixtures and fittings.—The manufacture of sockets, receptacles, bases, etc., for which figures are shown in Table 16, shows an increase in value of 21.9 per cent in 1914 over that reported for 1909.

Only electric-lighting fixtures made in connection with other electrical manufactures are included in the production reported in Table 16.

Electric fixtures constituted the product of chief value of 263 establishments classified as "gas and electric fixtures," with products valued at $15,468,275.

The following statement summarizes the production of electric fixtures by all classes of establishments, not including, however, combined gas and electric fixtures, except as the same were made by establishments engaged primarily in the manufacture of electric fixtures:

Total products, value	$19,873,883
Establishments engaged primarily in the manufacture of electric fixtures, all products	15,468,275
Electric fixtures, made by establishments engaged primarily in the manufacture of—	
Electrical machinery, apparatus, and supplies	3,383,955
Gas and combination fixtures	701,400
Other manufactures, principally hardware	320,253

Telegraph apparatus.—Table 25 shows the production of telegraph instruments and apparatus in 1914, 1909, 1904, and 1899.

Table 25 CLASS.	TELEGRAPH APPARATUS.			
	1914	1909	1904	1899
Total value	$2,248,375	$1,957,432	$1,111,194	$1,642,266
Police, fire, district, and miscellaneous	1,258,954	1,126,658	592,070	1,231,167
Wireless apparatus	672,575	448,262	114,050	(1)
Intelligence (key sounder, etc.)	201,956	197,660	187,744	354,212
Switchboards and telegraph parts and supplies	119,890	184,843	217,330	56,887

[1] Figures not available.

Of the several groups of products, wireless apparatus shows a substantial growth, an increase of 50 per cent in 1914 as compared with 1909. The figures do not represent the magnitude of the wireless installations, as they cover only the instruments and appliances turned out by the factories during the census years.

Telephone apparatus.—Table 26 shows the statistics for telephone apparatus for 1914, 1909, and 1904.

Table 26 CLASS.	TELEPHONE APPARATUS.		
	1914	1909	1904
Total value	$22,815,640	$14,259,357	$15,963,698
Substation instruments:			
Central battery—			
Number	641,082		
Value	$3,916,869		
Magneto—			
Number	216,879		
Value	$1,799,834		
Interior systems:			
Number	62,258	$10,137,534	$13,227,008
Value	$510,509		
Central switchboards	$12,079,337		
Manual	$11,076,615		
Central battery	$10,701,764		
Magneto	$374,851		
Automatic	$1,002,722		
Private branch exchange switchboards:			
Number	3,693	2,252	3,917
Value	$448,203	$369,915	$564,795
Parts and supplies, value	$4,060,888	$3,751,908	$3,071,895

The aggregate value of all telephone apparatus, parts, and supplies produced in 1914 shows an increase of $8,556,283, or 60 per cent, over that reported for 1909. It is difficult to analyze this increase in telephone apparatus of various types, owing to changes in the schedule used to collect the data at the different censuses.

Substation instruments, interior systems, and central switchboards, as reported in 1914, showed an

aggregate value of $18,306,549, as compared with $10,137,534 in 1909, an increase of 80 per cent. These were reported at the censuses of 1909 and 1904 under different headings. By far the greatest increase is in central switchboards. In 1909 central switchboards only were called for and reported, to the value of $2,398,909.

Under "substation instruments" in 1914 central battery and magneto instruments were reported to the value of $5,716,703. In 1909 separately reported transmitters and receivers reached a combined value of $2,511,691, in addition to which 732,697 "complete sets of instruments" were reported, valued at $5,103,849.

In 1909 interior systems without instruments were reported to the value of $123,085, as compared with $510,509 in 1914. Private branch exchange switchboards show an increase of 64 per cent in number and 21.2 per cent in value for 1914 as compared with 1909.

Insulated wire and cables.—Table 27 shows the value of the production of insulated wire and cables, by states, for 1914, 1909, and 1904.

Table 27

STATE.	INSULATED WIRE AND CABLES.		
	1914	1909	1904
United States,[1] total value	$69,505,573	$51,624,737	$34,519,699
New York	19,178,327	9,485,282	10,911,897
New Jersey	15,088,971	13,945,425	8,234,885
Illinois	9,626,775	9,487,006	3,666,313
Massachusetts	6,799,411	2,194,474	1,001,522
Connecticut	6,206,803	4,205,509	2,156,369
Rhode Island	6,045,876	7,741,411	5,122,464
Pennsylvania	3,299,485	2,796,825	2,885,052
All other states	3,309,925	1,768,805	541,197

[1] Production in 1899, $21,292,001.

The value of insulated wire and cables constituted the largest single item for the industry, as presented in Table 16. It forms nearly one-fifth of the total value of products and shows an increase of 34.6 per cent over the value of like products in 1909. Of this total amount, $51,321,609 was produced by 64 establishments engaged primarily in electrical manufactures and $18,183,964 by 13 establishments in other industries.

New York, New Jersey, and Illinois were the leading states in this branch of the industry. The combined production of these three states amounted to 63.1 per cent of the total value of all insulated wire and cables manufactured in the United States in 1914, 63.8 per cent in 1909, and 66.1 per cent in 1904.

Electric heating.—Table 28 gives the statistics for electric heating apparatus, comprising heating, cooking, and welding devices, for 1914, 1909, and 1904.

In 1904, 15 establishments reported heating and welding apparatus to the value of $395,827. With the growing use of electric heaters, stoves, and cooking apparatus, flatirons, soldering, sealing, and branding devices, this branch of the industry increased to over $4,000,000 in 1914.

Table 28

CLASS.	ELECTRIC HEATING APPARATUS.		
	1914	1909	1904
Total value	$4,048,915	$1,954,112	$395,827
Air heaters, including those for cars	352,617	919,533	(1)
Stoves and ranges	671,413		
Miscellaneous cooking devices	1,327,183		
Flatirons	1,466,630	951,074	(1)
Welding apparatus (not including motor-generator sets)	231,082	83,505	(1)

[1] Not reported separately.

Electric air heaters and cooking devices increased from $919,533 in 1909 to $2,351,213 in 1914, or 155.7 per cent. This item for 1909 comprises electric heaters, including those for cars, to the value of $638,979, and cooking stoves, to the value of $280,554. Stoves and ranges were not reported separately in 1909 and no accurate comparison with the statistics for 1914 can be made, but it seems clear that the greatest increase during the last five-year period was in miscellaneous cooking devices, such as grills, chafing dishes, toasters, hot plates, percolators, etc. It is probable that a considerable product of miscellaneous heating (other than cooking) devices, heating pads and appliances, immersion heaters, electric curling irons, wavers, etc., was not reported separately for 1914, but merged with unclassified electrical machinery, apparatus, and supplies.

The value of the electric flatirons manufactured in 1914 is an increase of 54.2 per cent, as compared with that of 1909.

Electric welding not only effects the joining together of two pieces of the same metal, but permits the welding together of different metals. The process usually employed is to pass a heavy current at low voltage through the abutting ends of the pieces of metal to be welded, and bringing them to a welding temperature at the same time that they are being pressed together. Internal heat is developed at the point of juncture, and, since it is first produced in the interior of the welding parts, the interior of the joint is as efficiently united as the visible exterior. Apparatus for electric welding (not including motor-generator sets) was reported to the value of $231,082 for 1914, as compared with $83,505 for 1909, an increase of 176.7 per cent.

Electric measuring instruments.—Table 29 shows the value of electrical measuring instruments of various kinds for 1914, 1909, and 1904.

The statistics show an increase of 12.6 per cent for 1914 as compared with 1909. Of the total production for 1914, meters for consumers' circuits comprised 69.7 per cent; station apparatus, 18.1 per cent; and

instruments for testing and scientific purposes, 12.2 per cent.

Table 29

KIND.	ELECTRIC MEASURING INSTRUMENTS.		
	1914	1909	1904
Total value	$8,786,506	$7,800,010	$5,004,763
Meters for consumers' circuits	6,127,946	5,613,838	3,585,080
Station apparatus	1,585,500	1,639,202	418,998
Testing and scientific instruments	1,073,060	546,970	1,000,685

Miscellaneous electrical products.—Table 30 shows the production of magneto-ignition apparatus, spark plugs, coils, etc., by states, for 1914 and 1909.

Table 30

STATE.	MAGNETO-IGNITION APPARATUS, SPARK PLUGS, COILS, ETC., VALUE.		
	1914	1909	1904
United States	$22,260,847	$6,092,343	$678,077
Ohio	7,472,268	131,055	56,022
Massachusetts	4,404,489	830,093	156,670
Indiana	2,980,792	2,223,221	159,610
New Jersey	2,022,684	469,952	(1)
Connecticut	1,537,324	240,629	(1)
New York	1,206,494	1,483,735	224,780
Pennsylvania	538,762	(1)	(1)
Illinois	413,986	253,451	.....
Michigan	386,120	290,234	47,710
Wisconsin	202,130	63,606	.....
All other states	227,796	106,367	33,326

[1] Included in "all other states."

The manufacture of magneto-ignition apparatus was first reported separately in 1904. The growth of the gasoline automobile industry has stimulated the production which increased from less than $700,000 in 1904 to over $22,000,000 in 1914. It now forms one of the most important branches of electrical manufacture. The states are ranked in the table according to the value of products, Ohio leading with one-third of the total value.

The following classes of electrical products, for which statistics are not given in the foregoing detail tables, are shown separately in Table 16; switches, signals, and attachments; conduits (underground and interior); locomotives; therapeutic apparatus; circuit fittings; fuses, lightning arresters; clocks and time mechanisms, and annunciators.

The value of the production of switches, signals and attachments in 1914 was an increase of 18.9 per cent over that for 1909. The increase in the value of electric therapeutic apparatus was 139.5 per cent; circuit fittings, 91.4 per cent; electric fuses, 75.4 per cent; lightning arresters, 26.4 per cent; electric clocks and time mechanisms, 16.5 per cent; and annunciators, 12 per cent. The value of the production of electric locomotives (mine and railway) in 1914, $3,720,914, represents 900 in number.

The large amount reported as the value of unclassified electrical machinery, apparatus, and supplies, $27,276,294, includes a number of articles which could not be segregated from other apparatus. There is included a considerable production of insulating compounds and supplies, electric mining, ventilating, drilling, grinding, and hoisting machinery, electric sign flashers, vacuum cleaners, heating pads and appliances, burglar alarms, small transformers, and toy motors and generators, electric toys, novelties and specialties of all kinds, as well as a considerable value of supplies and parts for incandescent lamps.

The value of "all other products, including amount received for custom work and repairing" in Table 16 includes electrical custom work and repairing, to the value of $5,676,592 in 1914, and $5,692,543 in 1909. This embraces the making of special electrical apparatus to order, as well as repairing electrical machinery, rewinding armatures, etc. The remaining $17,951,652 for 1914, and $12,073,102 for 1909 represent commodities not electrical in their nature, of which the most important are wire and foundry and machine-shop products.

DETAIL STATE TABLES.

The principal statistics secured by the census inquiry concerning establishments engaged in the manufacture of electrical machinery, apparatus, and supplies, are presented in Tables 31 and 32. Table 31 shows, for 1914, 1909, and 1904, by states, the number of establishments, average number of wage earners, primary horsepower, wages, cost of materials, and value of products as reported for the industry.

Table 32 presents, for 1914, by states, the more detailed statistics of the industry.

TABLE 31.—COMPARATIVE SUMMARY, BY STATES, FOR 1914, 1909, AND 1904.

STATE.	Census year.	Number of establishments.	Wage earners (average number).	Primary horsepower.	Wages.	Cost of materials.	Value of products.
					Expressed in thousands.		
United States	1914	1,030	118,078	227,731	$73,906	$154,728	$335,170
	1909	1,009	87,256	158,768	49,381	108,566	221,309
	1904	784	60,466	105,376	31,842	66,837	140,809
California	1914	29	780	1,116	472	1,560	2,862
	1909	27	435	442	240	928	1,613
	1904	24	403	278	244	434	1,004
Connecticut	1914	43	5,059	6,459	2,630	7,436	14,330
	1909	41	3,505	4,457	1,603	5,211	9,834
	1904	32	1,707	2,505	724	2,754	4,940
Illinois	1914	142	16,483	21,140	12,366	19,379	45,667
	1909	143	9,641	11,636	6,413	13,628	26,826
	1904	104	6,131	6,253	3,203	7,649	16,700
Indiana	1914	41	4,075	6,426	2,423	3,931	8,879
	1909	42	3,073	5,285	1,361	3,993	7,718
	1904	34	1,416	3,042	664	1,067	2,857
Iowa	1914	5	94	88	58	87	235
	1909	9	64	84	31	74	200
Maryland	1914	6	66	80	35	40	121
	1909	7	121	266	41	54	147
	1904	6	161	329	66	93	225
Massachusetts	1914	91	17,125	29,846	10,651	17,697	43,869
	1909	83	14,507	14,535	8,209	12,735	28,143
	1904	72	8,798	9,341	5,003	7,324	15,882
Michigan	1914	35	1,144	1,584	656	1,740	3,416
	1909	40	1,218	1,355	494	1,030	2,327
	1904	14	529	379	177	294	702
Minnesota	1914	17	226	393	161	348	749
	1909	13	187	205	101	220	526
	1904	15	170	140	103	187	424
Missouri	1914	19	2,560	1,918	1,536	2,416	6,643
	1909	20	1,060	1,180	627	1,104	3,251
	1904	20	795	824	412	606	1,741
New Hampshire	1914	6	228	392	$122	$165	$352
	1909	6	193	422	87	155	388
	1904	5	83	172	32	88	150
New Jersey	1914	76	14,405	22,860	7,867	20,549	40,741
	1909	69	11,099	11,326	5,615	14,426	28,365
	1904	42	6,268	6,547	2,894	6,873	13,803
New York	1914	215	23,738	71,453	16,187	38,025	73,945
	1909	217	18,972	53,813	12,479	27,483	49,290
	1904	175	16,301	33,059	9,267	17,846	35,348
North Carolina	1914	4	78	89	31	106	177
	1909	3	120	88	31	97	150
Ohio	1914	119	12,695	17,771	7,409	17,482	36,121
	1909	115	8,073	11,959	3,847	7,226	18,777
	1904	92	5,114	7,138	2,268	4,699	11,019
Pennsylvania	1914	105	14,866	36,537	8,737	17,240	44,396
	1909	84	11,025	33,829	6,237	13,535	31,351
	1904	80	9,404	29,238	5,300	11,365	26,258
Rhode Island	1914	13	1,581	3,638	734	3,793	5,468
	1909	12	1,601	2,837	678	4,595	6,410
	1904	11	1,409	3,223	557	4,017	5,435
West Virginia	1914	4	162	1,369	75	184	566
	1909	5	137	1,115	77	135	396
Wisconsin	1914	29	2,115	3,616	1,340	2,064	5,397
	1909	30	1,409	2,333	820	1,451	3,536
	1904	23	1,204	2,173	673	1,020	3,194
All other states	1914	31	588	956	316	486	1,236
	1909	43	816	1,351	390	786	1,760
	1904	35	573	735	235	521	1,127